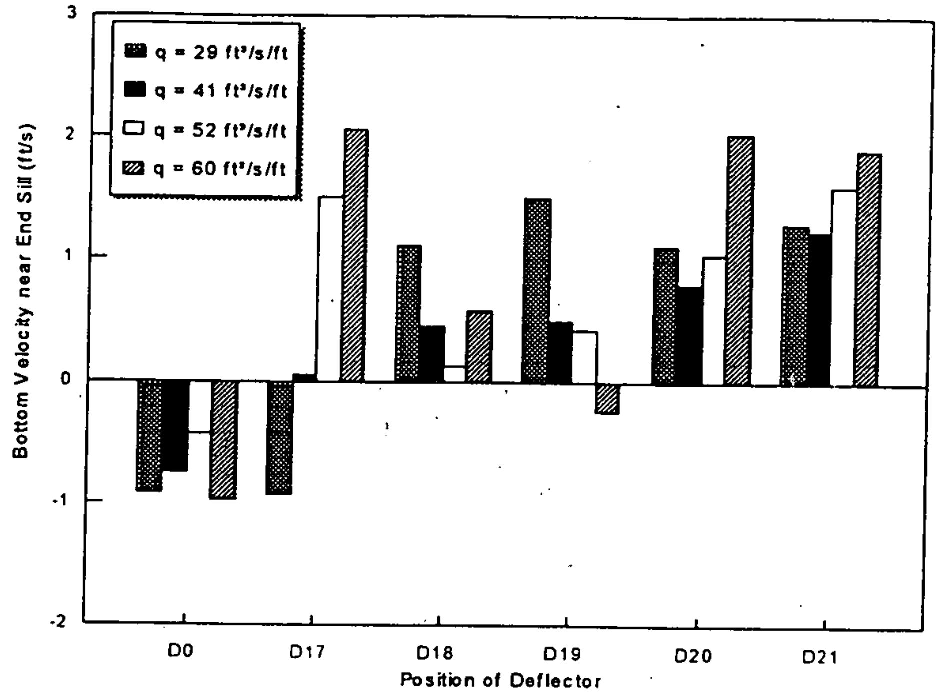

Figure 4. Bottom velocities (average) measured for each deflector position. (D0 indicates no deflector was installed.)

Figure 4 demonstrates that flow conditions were improved as the angle was increased and the best overall results, throughout the range of flows, occurred with deflector D21 installed.

Table 1 shows the velocity range within one standard deviation (67 percent confidence level) for the bottom velocities measured for deflector D21 and with no deflector (D0) installed. The table demonstrates that with deflector D21 installed, velocities over the basin end sill act predominately in the positive or downstream direction. Without a deflector, the velocities predominantly act in the upstream direction.

Table 1. Bottom velocities within one standard deviation.

Deflector Position	Velocity Range Within One Standard Deviation (ft/s)			
	q = 29 ft³/s/ft	q = 41 ft³/s/ft	q = 52 ft³/s/ft	q = 60 ft³/s/ft
D21	-.14 to 2.67	-.08 to 2.56	.05 to 3.13	.14 to 3.62
D0	-2.1 to .239	-2.22 to .02	-1.62 to .43	-1.7 to .51

Each of these investigations was conducted with the tailwater depth set at a specific level according to the tailwater curve for Ridgway Dam outlets works operations. Future investigations will determine the best deflector positioning relative to fluctuations in tailwater depth.

CONCLUSIONS

Deflectors have been designed and installed at Taylor Draw Dam with marked improvements in stilling basin flow patterns; and based on the model study, performance of the deflectors show the potential for significant savings by reducing damage caused by abrasion.

The results of the Ridgway Dam hydraulic model study indicate that the effectiveness of the deflector depends on the basin discharge and on the deflector's relative position and sensitivity to the movement of the transition point throughout the range of operations. The study showed the deflector was most effective when it was located between 38 percent and 69 percent of the average tailwater depth over the full operating range, and positioned at an angle of 80 degrees.

Further investigations will determine if the deflector location can be generalized over large ranges of tailwater depth. If the variation of the tailwater (i.e. the operating range) is greater than 200 percent, a single deflector may not be effective. The structural design of the deflectors will depend on the material used, the overall width of the stilling basin, and the angle of the deflector. Future work may also involve determining the maximum basin width that the deflector design will be effective. — much

Further work at the Bureau of Reclamation Water Resources Research Laboratories will include generalizing flow deflector designs for Type III stilling basins.

REFERENCES

[1] Dodge, Russ, "Hydraulic Study of Taylor Draw Dam Outlet Works," U.S. Department of the Interior, Bureau of Reclamation Report R-92-10, March 1992.

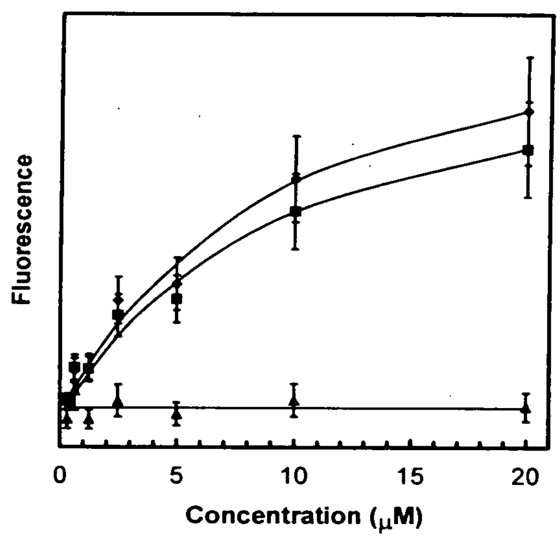

Figure 3

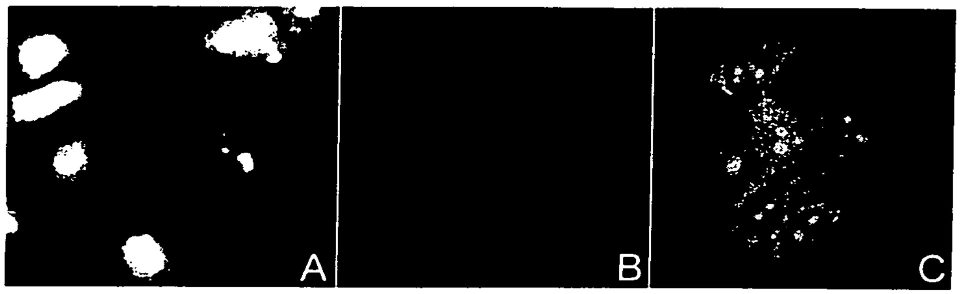

Figure 4

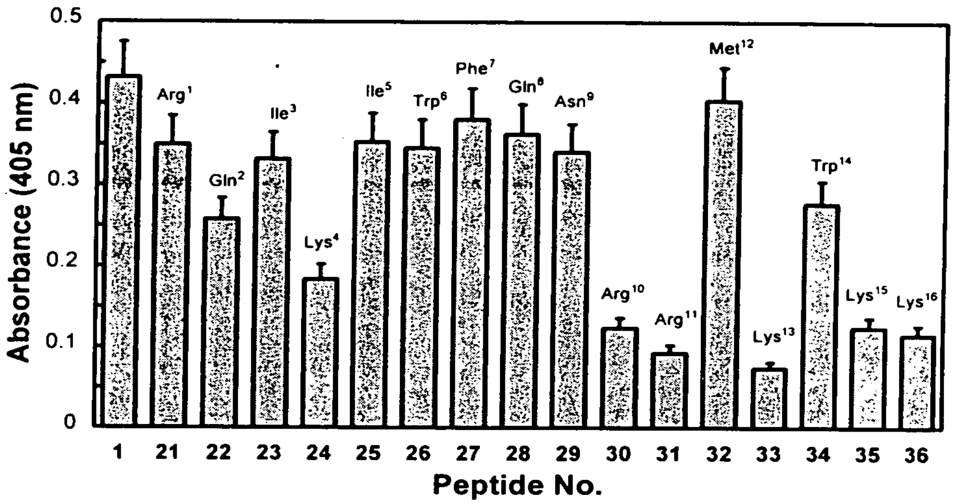
Absorbance (405 nm)
0.5
0.4
0.3
0.2
0.1
0
Arg1
Gln2
Ile3
Lys4
Ile5
Trp6
Phe7
Gln8
Asn9
Arg10
Arg11
Met12
Lys13
Trp14
Lys15
Lys16
1 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Peptide No.

Figure 5